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Partially-levitated membranes for high-frequency gravitational wave (HFGW) detection

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Patterned thin films that are freely suspended from a silicon chip (i.e., membranes) are some of the lowest-loss mechanical oscillators.

As such, they provide an exceptional level of isolation from the noisy environment, similar to what has been achieved with levitated nanoparticles.

Here, I will present a concept for a HFGW detector, which corresponds to a Michelson interferometer with a membrane incorporated in each arm cavity.

In addition to explaining the underlying operating principle, I will provide details on achieving a sensitivity comparable to the target for the Levitated Sensor Detector, which relies on optically levitated stacks instead of membranes. (see dedicated talks).

In this regard, a particular focus will be on realizing suitable membranes, which requires significantly reducing their intrinsic loss.

Author: REINHARDT, Christoph (DESY)

Presenter: REINHARDT, Christoph (DESY)

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